

Functions Practice

-Pre-Calc Style ☺

Do the circled problems

In Problems 39–46, find the following for each function:

(a) $f(0)$ (b) $f(1)$ (c) $f(-1)$ (d) $f(-x)$ (e) $-f(x)$ (f) $f(x+1)$ (g) $f(2x)$ (h) $f(x+h)$

39. $f(x) = 3x^2 + 2x - 4$ 40. $f(x) = -2x^2 + x - 1$ 41. $f(x) = \frac{x}{x^2 + 1}$ 42. $f(x) = \frac{x^2 - 1}{x + 4}$
 43. $f(x) = |x| + 4$ 44. $f(x) = \sqrt{x^2 + x}$ 45. $f(x) = \frac{2x + 1}{3x - 5}$ 46. $f(x) = 1 - \frac{1}{(x + 2)^2}$

In Problems 47–60, find the domain of each function.

47. $f(x) = -5x + 4$ 48. $f(x) = x^2 + 2$ 49. $f(x) = \frac{x}{x^2 + 1}$ 50. $f(x) = \frac{x^2}{x^2 + 1}$
 51. $g(x) = \frac{x}{x^2 - 16}$ 52. $h(x) = \frac{2x}{x^2 - 4}$ 53. $F(x) = \frac{x - 2}{x^3 + x}$ 54. $G(x) = \frac{x + 4}{x^3 - 4x}$
 55. $h(x) = \sqrt{3x - 12}$ 56. $G(x) = \sqrt{1 - x}$ 57. $f(x) = \frac{4}{\sqrt{x - 9}}$ 58. $f(x) = \frac{x}{\sqrt{x - 4}}$
 59. $p(x) = \sqrt{\frac{2}{x - 1}}$ 60. $q(x) = \sqrt{-x - 2}$

In Problems 61–70, for the given functions f and g , find the following. For parts (a)–(d), also find the domain.

(a) $(f + g)(x)$ (b) $(f - g)(x)$ (c) $(f \cdot g)(x)$ (d) $\left(\frac{f}{g}\right)(x)$
 (e) $(f + g)(3)$ (f) $(f - g)(4)$ (g) $(f \cdot g)(2)$ (h) $\left(\frac{f}{g}\right)(1)$

61. $f(x) = 3x + 4$; $g(x) = 2x - 3$

62. $f(x) = 2x + 1$; $g(x) = 3x - 2$

63. $f(x) = x - 1$; $g(x) = 2x^2$

64. $f(x) = 2x^2 + 3$; $g(x) = 4x^3 + 1$

65. $f(x) = \sqrt{x}$; $g(x) = 3x - 5$

66. $f(x) = |x|$; $g(x) = x^2$

67. $f(x) = 1 + \frac{1}{x}$; $g(x) = \frac{1}{x}$

68. $f(x) = \sqrt{x - 1}$; $g(x) = \sqrt{4 - x}$

69. $f(x) = \frac{2x + 3}{3x - 2}$; $g(x) = \frac{4x}{3x - 2}$

70. $f(x) = \sqrt{x + 1}$; $g(x) = \frac{2}{x}$

71. Given $f(x) = 3x + 1$ and $(f + g)(x) = 6 - \frac{1}{2}x$, find the function g .

72. Given $f(x) = \frac{1}{x}$ and $\left(\frac{f}{g}\right)(x) = \frac{x + 1}{x^2 - x}$, find the function g .

In Problems 73–80, find the difference quotient of f ; that is, find $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$, for each function. Be sure to simplify.

73. $f(x) = 4x + 3$

74. $f(x) = -3x + 1$

75. $f(x) = x^2 - x + 4$

76. $f(x) = x^2 + 5x - 1$

77. $f(x) = 3x^2 - 2x + 6$

78. $f(x) = 4x^2 + 5x - 7$

79. $f(x) = x^3 - 2$

80. $f(x) = \frac{1}{x+3}$

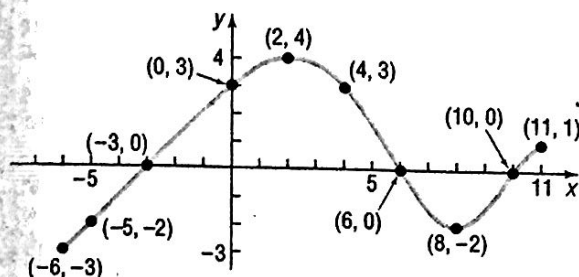
Applications and Extensions

81. If $f(x) = 2x^3 + Ax^2 + 4x - 5$ and $f(2) = 5$, what is the value of A ?

82. If $f(x) = 3x^2 - Bx + 4$ and $f(-1) = 12$, what is the value of B ?

83. If $f(x) = \frac{3x+8}{2x-A}$ and $f(0) = 2$, what is the value of A ?

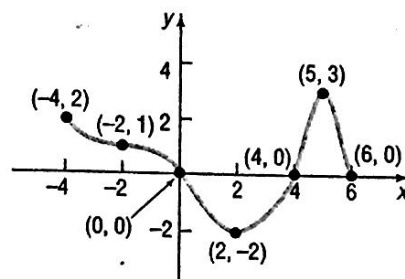
9. Use the graph below of the function f to answer parts (a)–(n).



- Find $f(0)$ and $f(-6)$.
- Find $f(6)$ and $f(11)$.
- Is $f(3)$ positive or negative?
- Is $f(-4)$ positive or negative?
- For what values of x is $f(x) = 0$?
- For what values of x is $f(x) > 0$?
- What is the domain of f ?
- What is the range of f ?
- What are the x -intercepts?
- What is the y -intercept?
- How often does the line $y = \frac{1}{2}$ intersect the graph?
- How often does the line $x = 5$ intersect the graph?
- For what values of x does $f(x) = 3$?
- For what values of x does $f(x) = -2$?

- What is the height of the rock when $x = 1$ second? $x = 1.1$ seconds? $x = 1.2$ seconds? $x = 1.3$ seconds?
- When is the height of the rock 15 meters? When is it 10 meters? When is it 5 meters?
- When does the rock strike the ground?

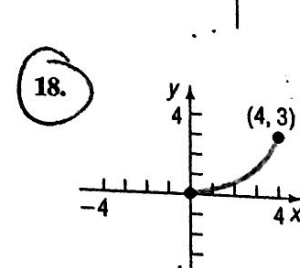
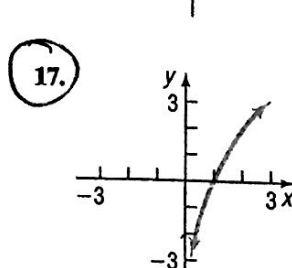
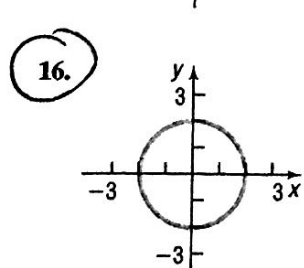
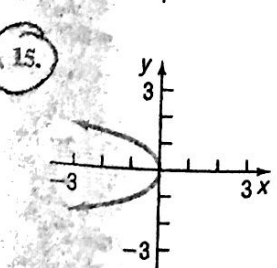
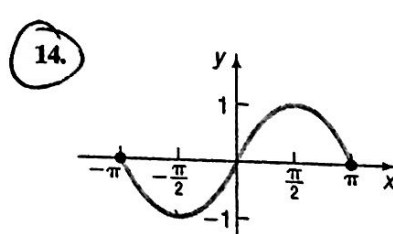
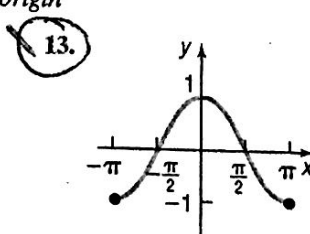
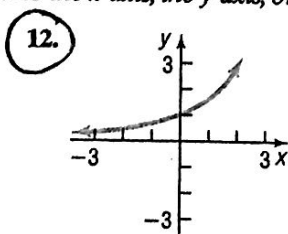
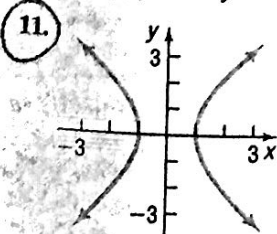
94. **Effect of Gravity on Jupiter** If a rock falls from a height of 20 meters on the planet Jupiter, its height h (in meters) after t seconds is given by $h(t) = -4.9t^2 + 20$. Use the graph below of the function f to answer parts (a)–(n).



- Find $f(0)$ and $f(6)$.
- Find $f(2)$ and $f(-2)$.
- Is $f(3)$ positive or negative?
- Is $f(-1)$ positive or negative?
- For what values of x is $f(x) = 0$?
- For what values of x is $f(x) < 0$?
- What is the domain of f ?
- What is the range of f ?
- What are the x -intercepts?
- What is the y -intercept?
- How often does the line $y = -1$ intersect the graph?
- How often does the line $x = 1$ intersect the graph?
- For what value of x does $f(x) = 3$?
- For what value of x does $f(x) = -2$?

In Problems 11–22, determine whether the graph is that of a function by using the vertical-line test. If it is, use the graph to find:

- The domain and range
- The intercepts, if any
- Any symmetry with respect to the x -axis, the y -axis, or the origin



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42. $f(x) = \frac{x^2 - 1}{x + 4}$

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51. $g(x) = \frac{x}{x^2 - 16}$

52. $h(x) = \frac{2x}{x^2 - 4}$

53. $F(x) = \frac{x - 2}{x^3 + x}$

54. $G(x) = \frac{x + 4}{x^3 - 4x}$

55. $h(x) = \sqrt{3x - 12}$

56. $G(x) = \sqrt{1 - x}$

57. $f(x) = \frac{4}{\sqrt{x - 9}}$

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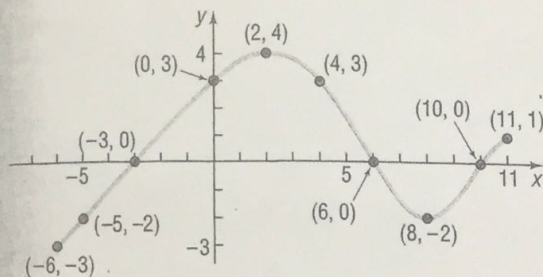
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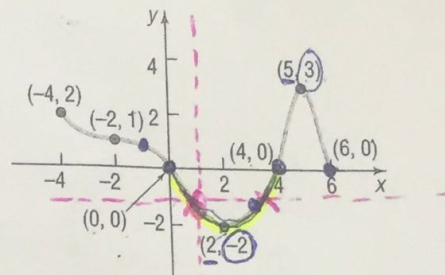
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- Is $f(3)$ positive or negative?
- Is $f(-1)$ positive or negative?
- For what values of x is $f(x) = 0$? $0, 4, 6$
- For what values of x is $f(x) < 0$? $(0, 4) \cup (4, 6)$
- What is the domain of f ? $[-4, 6]$
- What is the range of f ? $[-2, 3]$
- What are the x -intercepts? $(0, 0), (4, 0), (6, 0)$
- What is the y -intercept? $(0, 0)$
- How often does the line $y = -1$ intersect the graph? *twice*
- How often does the line $x = 1$ intersect the graph? *once*
- For what value of x does $f(x) = 3$? 5
- For what value of x does $f(x) = -2$? 2

In Problems 11–22, determine whether the graph is that of a function by using the vertical-line test. If it is, use the graph to find:

- The domain and range
- The intercepts, if any
- Any symmetry with respect to the x -axis, the y -axis, or the origin

